



## ***Cordylancistrus santarosensis* (Siluriformes: Loricariidae), a new species with unique snout deplation from the Río Santa Rosa, Ecuador**

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### **Abstract**

*Cordylancistrus santarosensis* is described based on five specimens from the Río Santa Rosa, Ecuador. This species can be distinguished from all other members of the *Chaetostoma* group by having plates on the tip of the snout (except for a central region at the extreme anterior edge), but lacking plates laterally on the head. This snout plating condition is intermediate between the fully plated snout of other *Cordylancistrus* and the unplated snout of *Chaetostoma*.

**Keywords:** Ancistrini, suckermouth armoured catfish, Ecuador, South America, Neotropics

### **Introduction**

*Cordylancistrus* is a genus of loricariid catfish that includes fish similar to *Chaetostoma* Tschudi. *Cordylancistrus* was first described as a monotypic genus by Isbrücker (1980), with *Cordylancistrus torbesensis* (Schultz) as the type species. Pérez and Provenzano (1996) described a second species to the genus, *Co. perijae*. Isbrücker (2001) expanded the genus with three additional species: *Co. daguae* (Eigenmann), *Co. platycephalus* (Boulenger), and *Co. platyrhynchus* (Fowler). Armbruster (2004) found no characters that supported the monophyly of *Cordylancistrus*, but found that *Cordylancistrus* was part of a monophyletic group along with *Chaetostoma*, *Dolichancistrus* Isbrücker, and *Leptoancistrus* Meek and Hildebrand. Additionally, *Co. platyrhynchus* was moved to *Chaetostoma* because it only differs from other *Chaetostoma* by the presence of snout plates (vs. unplated snout) (Armbruster 2004). Provenzano and Milani (2006) tentatively placed *Ch. platyrhyncha* back into *Cordylancistrus* and described a new species, *Cordylancistrus nephelion*. Armbruster (2008) found that *Cordylancistrus*, excluding *Ch. platyrhyncha*, was still polyphyletic.

With the exclusion of *Chaetostoma platyrhyncha* from *Cordylancistrus*, *Co. platycephalus* is the only species in the genus found in Ecuador, and is known from cis-Andean streams. *Cordylancistrus santarosensis* is described here from specimens collected in the trans-Andean Río Santa Rosa (Gulf of Guayaquil drainage) in southern Ecuador. This new species differs from all other *Cordylancistrus* by its unique snout plate distribution. It is superficially similar in external morphology to *Chaetostoma platyrhyncha*, but these two species can be distinguished by meristics and morphometrics as well as the snout deplation of *Co. santarosensis*.

### **Methods**

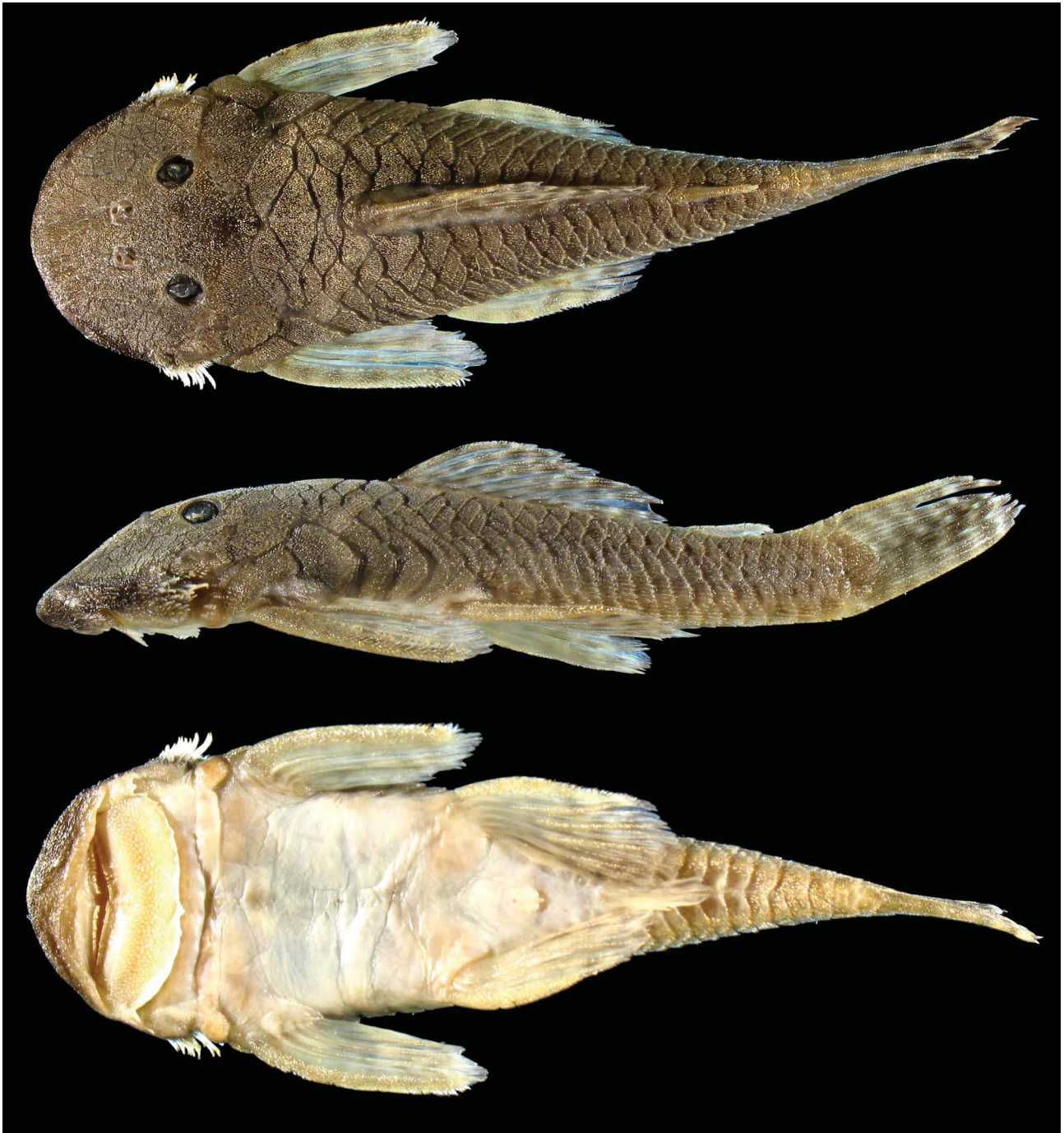
Measurements and meristics follow Armbruster (2003). A specimen was cleared and stained according to procedures derived from Taylor and Van Dyke (1985). Institutional abbreviations are as listed in Sabaj Pérez (2010); MECN-DP stands for Museo Ecuatoriano de Ciencias Naturales. Phylogenetic data for *Cordylancistrus santarosensis* were collected based on Armbruster (2004, 2008) and presented in Appendix I. The phylogenetic data was analyzed with the traditional methods search of TNT (Goloboff 2006) with ten trees saved per replication in 100 replications.

***Cordylancistrus santarosensis* new species**

Figs. 1, 2a

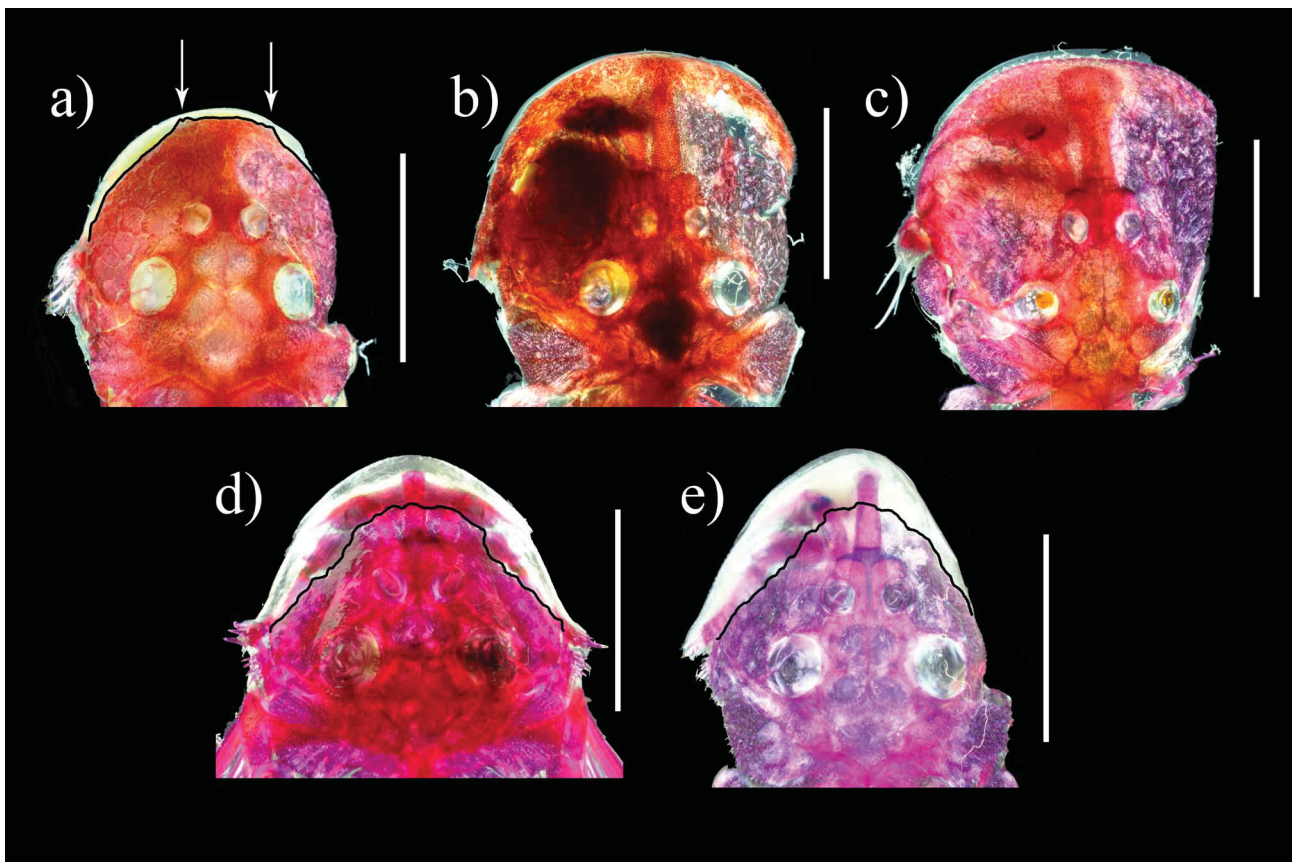
**Holotype:** MECN-DP 2061, 70.8 mm SL, Ecuador, El Oro Province, Pacific Ocean drainage, Río Santa Rosa, 13.5 km S of Santa Rosa on Hwy 92, -3.56944°, -79.94291°, W. Aguirre, 9 July 2008.

**Paratypes:** 5 specimens. All collections Ecuador, Río Santa Rosa. MECN-DP 2063, 1, 49.7 mm SL, Ecuador, El Oro Province, Pacific Ocean drainage, Río Santa Rosa, 13 km S of Santa Rosa on Hwy 92. -3.564139°, -79.942306°, W. Aguirre, 9 July 2008. Remaining paratypes same locality data as holotype: MECN-DP 2062, 1, 24.3 mm SL; FMNH 120532, 1: 43.5 mm SL; AUM 52887, 2, 1 cleared and stained 43.9 mm SL, 1 specimen 44.3 mm SL.



**FIGURE 1.** *Cordylancistrus santarosensis*, holotype, 70.8 mm SL, dorsal, lateral, and ventral views. Photos by M. Tan.

**Diagnosis.** *Cordylancistrus santarosensis* can be distinguished from all other members of the *Chaetostoma* group by having plates at the end of the snout (except for a central region at the extreme anterior edge), but lacking plates laterally on the head (vs. either a fully plated snout or a naked snout) (Fig 2a). *Cordylancistrus santarosensis* can be distinguished from *Co. platycephalus* by the lack of keels on the lateral plates (vs. presence of keels on the lateral plates); from *Co. platycephalus*, *Co. nephelion*, and *Chaetostoma* (including *Ch. platyrhyncha*) by the lack of a large papilla or papillae behind the dentary teeth (vs. dentary papilla present); from *Co. daguae* and *Co. torbesensis* by hypertrophied odontodes not reaching past the gill openings (vs. hypertrophied odontodes extending to or beyond pectoral-fin spine insertion); from *Co. daguae* and *Co. nephelion* by the lack of marked undulations in the lower lip (vs. lower lip with marked undulations); and from *Ch. platyrhyncha* by the presence of hypertrophied cheek odontodes reaching the gill opening (vs. cheek odontodes not well-developed); dorsal fin when adpressed not reaching the preadipose plates (vs. extending to or beyond preadipose plates); five anal-fin rays (vs. two to three anal-fin rays), and typically has 8 dorsal-fin rays (the holotype has 9 dorsal-fin rays) in *Co. santarosensis* (vs. usually 9–10 dorsal-fin rays in *Ch. platyrhyncha*).



**FIGURE 2.** Dorsal view of left side of head of cleared-and-stained specimens, showing the difference in distribution of snout plates between a) *Cordylancistrus santarosensis*, AUM 52887, b) *Chaetostoma platyrhyncha*, ANSP 84570, c) *Co. torbesensis*, MCNG 8066, d) *Ch. guariense*, AUM 39880, and e) *Ch. stanni*, INHS 28838. Black line in a, d, and e represents the edge of the distribution of snout plates. The suspensorium has been removed from a, b, c, and e. Vertical bar represents 10 mm. Arrows point to where plates extend further towards the snout margin, between which there is a central region without plates at the extreme anterior edge of the snout (see Description). Photos by M. Tan.

**Description.** Morphometric data are given in Table 1. Largest specimen holotype, 70.8 mm SL. Body wide and depressed. Caudal peduncle compressed. Head wide and depressed, snout rounded. Body depth gently increases from the snout to the nares, angle of increase in body depth decreases between the nares and nuchal plate. Body depth gently decreases from nuchal plate to anteriormost dorsal procurrent caudal fin rays, then increases to caudal fin. Ventral surface flat.



Plates absent from anterior tip of snout. Naked snout tip followed by two columns of small plates (arrows, Fig. 2a), and then narrow naked areas to evertible cheek plates; region posterior to snout tip fully plated medially. Lateral plates without keels. Mid-ventral plates bent at their midline above pectoral fin to form a weak ridge. Abdomen and ventral surface anterior to abdomen unplated. Five rows of plates on caudal peduncle. Median series 24 plates, mid-dorsal series 23–24 (mode 23) plates, mid-ventral series 23–26 (mode 24) plates. Exposed bones, plates and fin spines and rays covered in odontodes. Interopercular odontodes 16–31 (mode 19), holotype (31); number of odontodes greater with increased standard length, odontodes reaching to gill opening.

**TABLE 1.** Morphometric data of *Cordylancistrus santarosensis*. Morphometric data are given as percentages of standard length.

	Holotype	Avg	SD	Min	Max
SL	70.8	44.3	43.5	43.9	49.7
Predorsal Length	44.1	47.0	46.1	45.0	46.0
Head Length	34.2	34.9	35.5	33.7	36.5
Head-dorsal Length	9.8	10.5	8.2	10.2	9.4
Head-eye Length	12.8	13.4	12.8	13.6	14.0
Orbit Diameter	5.4	6.2	6.0	6.9	5.6
Snout Length	21.3	20.5	21.5	19.5	21.4
Internares Width	4.2	4.7	4.6	4.1	3.9
Interorbital Width	14.7	18.0	18.0	17.8	16.2
Cleithral Width	30.3	30.7	30.8	29.3	31.9
Head-pectoral Length	32.1	30.3	30.4	31.2	31.7
Thorax Length	24.4	21.8	23.4	21.6	25.0
Pectoral-spine Length	26.5	26.8	25.7	25.4	28.4
Abdominal Length	22.4	23.6	24.0	20.9	22.3
Pelvic Unbranched Ray Length	24.0	24.8	23.7	25.2	27.3
Postanal Length	33.4	30.8	31.2	30.2	31.6
Anal-fin Unbranched Ray Length	9.0	8.2	12.5	8.5	9.0
Head Depth	24.5	24.5	24.4	25.0	24.4
Dorsal-pectoral Distance	28.2	28.2	27.7	28.7	28.8
Dorsal spine Length	20.1	22.8	20.6	22.0	22.7
Dorsal-pelvic Distance	19.6	21.6	22.0	22.7	19.0
Dorsal-fin base Length	25.1	25.1	24.9	24.2	23.1
Dorsal-adipose Distance	14.9	15.7	14.5	15.6	14.8
Adipose-spine Length	8.2	8.6	8.6	8.4	9.7
Adipose-upper caudal Distance	14.3	14.7	14.8	12.4	13.3
Caudal peduncle Depth	9.5	11.1	11.3	12.4	9.5
Adipose-lower caudal Distance	21.8	21.0	22.6	18.4	21.8
Adipose-anal Distance	17.4	19.7	18.4	17.7	16.6
Dorsal-anal Distance	13.1	15.0	15.0	14.9	14.3
Pelvic-dorsal Distance	23.4	26.6	27.7	24.2	24.1
Mouth Length	18.9	21.2	21.1	21.0	21.6
Mouth Width	29.7	28.7	29.2	29.9	29.4
Barbel Length	3.4	4.0	3.1	3.5	2.2
Dentary tooth cup Length	10.1	10.3	7.6	7.7	10.5
Premaxillary tooth cup Length	9.8	10.1	9.7	9.3	8.6

All fin spines and rays support odontodes. Dorsal fin II, 8–9 (mode 8); spinelet *V*-shaped, covered by skin, dorsal-fin spine lock functional. Nuchal plate variably exposed or hidden by predorsal plates. Dorsal spinelet covered by skin, and spinelet supporting odontodes in the holotype. Dorsal fin not reaching adipose fin when adpressed. Pectoral fins I, 6. Pectoral fin reaches to pelvic fin unbranched ray insertion when adpressed ventral to pelvic fin. Pelvic fins i, 5, lacking a fleshy crest, and not greatly widened. Anal fin i, 5. Caudal fin i, 14, i, obliquely truncate. Iris operculum present. Mouth wide with papillose lips, papillae of anterior lip larger. Dentary lacks large papillae behind teeth. Edge of posterior lip crenulate. Maxillary barbel base fused to posterior lip by a fleshy flap, barbel tip free. Jaws wide and jaw angle almost 180°. Teeth bicuspid with medial lobe longer than lateral lobe. Crown yellow, stalk white. Dentary teeth 48–77 (median = 57, N = 5). Premaxillary teeth 37–63 (median = 45, N = 5).

**Color.** Specimens preserved in 70% alcohol have a uniformly dark green base color with light markings. Light line originating from posterior edge of first mid-ventral plate and continuing dorsally to insertion of dorsal fin spine. Body with three dark saddles, divided by two pale bands; the first pale band is below the middle rays of the dorsal fin, and the second below and anterior to the adipose fin insertion. Two pale spots are present on the lateral, posterior end of the caudal peduncle, one dorsal and one ventral. Abdomen uniformly whitish.

Fins with alternating light and dark bands. Pectoral, pelvic, and dorsal fins with five dark bands, and caudal fin with six dark bands. Adipose fin usually with no bands, although two thin white bands were present in one specimen. Dark bands on fins formed from horizontally elongate spots centered on fin rays. There is no pigment on fin membranes of unpaired fins, and there is little pigment on fin membranes of paired fins. Light interspaces of lower lobe of caudal fin considerably darker than interspaces of upper caudal lobe.

**Range.** Known only from the type locality in the Río Santa Rosa (Gulf of Guayaquil drainage) near the southern coast of Ecuador (Fig. 3).

**Etymology.** Named for the type locality, the Río Santa Rosa.

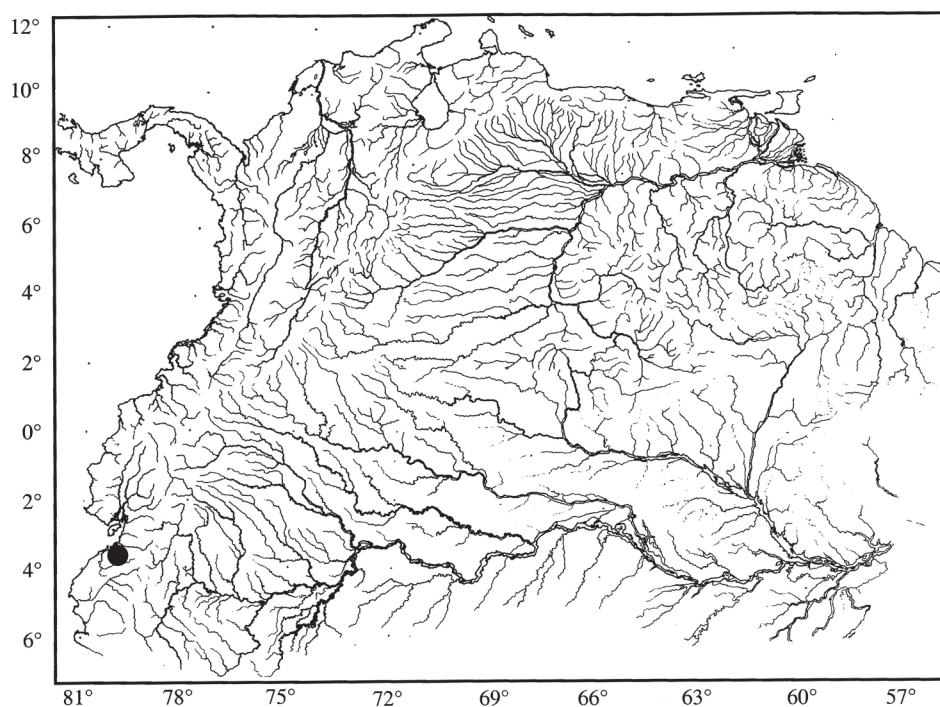


FIGURE 3. Map of South America, with both localities indicated by a dot.

## Discussion

The results of the phylogenetic analysis were consistent with the results from Armbruster (2008) suggesting that the methods utilized in TNT were suitable for addressing the relationships of *Cordylancistrus santarosensis*. *Cordylancistrus santarosensis* was found to be the sister of *Co. torbesensis* based on four synapomorphies: upper pharyngeal jaw with invagination in shelf (character 29, state 1, characters from Armbruster 2004), reversal to medial

and lateral walls of the pterygoid channel equal (55, 0), pointed distal margin of the transverse process of the Weberian complex centrum (132, 1), and straight anterior processes of the pelvic basipterygium (167, 2). Although each of the preceding characters are homoplasious in loricariids, each are uniquely derived in *Co. torbesensis* + *Co. santarosensis* within the *Chaetostoma* group.

*Cordylancistrus santarosensis* also possesses plates at the anterior margin of the snout, but lacks the external derived characters that define the clade of *Dolichancistrus* + *Leptoancistrus* (one or two extremely elongate cheek odontodes) or *Leptoancistrus* (anal fin absent, adipose fin replaced by low postdorsal ridge of median, azygous plates). What is interesting about *Co. santarosensis* is that although it does have plates on the anterior margin of the snout, it lacks them laterally on the head.

Unusual deplation patterns have been found in a couple of recently described genera in the Ancistrini (*Paulasquama callis* and *Soromonichthys stearleyi*, Armbruster & Taphorn 2011 and Lujan & Armbruster 2011, respectively). *Paulasquama* has plates along the lateral edge of the head, but they are small and embedded, and it lacks plates in broad ovals on either side of the midline of the head anteriorly from the nares. Armbruster and Taphorn (2011) found *Paulasquama* to be sister to the *Chaetostoma* group. *Soromonichthys* has an almost opposite pattern to that of *Paulasquama*, with no plates along the anterior margin of the snout (but plates posteriorly) and no plates dorsal to the mesethmoid. *Soromonichthys* was found to be sister to the *Chaetostoma* group plus a clade of *Lithoxus* and *Exastilithoxus* by Armbruster (2008); however, in the current analysis, it was sister only to *Lithoxus* and *Exastilithoxus*, though neither sets of relationships were strongly supported. The deplation patterns of *Paulasquama* and *Soromonichthys* do not appear to be related to that found in *Cordylancistrus santarosensis*, which has the synapomorphies of the *Chaetostoma* group (Armbruster 2004).

The deplation pattern of the snout of *Cordylancistrus santarosensis* is most similar to that of *Chaetostoma*, appearing as what could be proposed as an intermediate step between plated and deplated states. In *Co. santarosensis*, there is a broad, naked area right at the tip of the snout exposing just the anterior edge of the mesethmoid (this is present in many loricariids), two columns of very small plates, and then a naked lateral margin that is not as extensive as that of *Chaetostoma* (Fig 2a). On the other hand, *Chaetostoma* (excluding *Ch. platyrhyncha*) lacks plates over a broad area of the snout, with no plates along the edge of the head just anterior to the evertible cheek plates, no plates ventrolaterally anterior to the third infraorbital and plates absent from the anteromedial portion of the snout to about half the length of the mesethmoid (Fig 2d,e). Given the less extensive deplation of the snout in *Co. santarosensis* we did not code the species as having a naked snout (character 201, state 0), and the phylogeny suggests that the lack of plates along the snout in *Co. santarosensis* is not homologous with that of *Chaetostoma*. Indeed, we later coded *Co. santarosensis* as having a naked snout, and it was still found as sister to *Co. torbesensis*.

The biogeography of *Cordylancistrus* is puzzling. If *Chaetostoma platyrhyncha* and *Cordylancistrus platycephalus* are not related to the remaining *Cordylancistrus*, the range of the genus is difficult to interpret as no *Cordylancistrus sensu stricto* have been reported south of Colombia. This absence could be due to sampling error as we know of several undescribed species of *Cordylancistrus* in Colombia and the same may be true of Ecuador. Although other species of *Cordylancistrus* have among the longest jaws in the Loricariidae, *Co. santarosensis* has shorter jaws similar to those of *Chaetostoma*; competition with the apparently highly successful *Chaetostoma* (it is the second most speciose genus of Ancistrini with 45 species, Salcedo 2006), may have led to the wider jaws in other species of *Cordylancistrus* that are often sympatric with several species of *Chaetostoma*. On the other hand, *Co. santarosensis* may have narrower jaws as there is only one species of *Chaetostoma* (perhaps *Ch. aequinoctiale*) in the Río Santa Rosa, and there might not be enough competition to have led to modified jaws.

The Gulf of Guayaquil is a hypothesized western outlet for the Amazon River (Lundberg *et al.* 1998), and drainages of the Gulf contain unusual species. *Cordylancistrus santarosensis* may be a relict of this more ancient past, and thus would be basal to other species of *Cordylancistrus*. Much more exploration of the highlands of the Andes is necessary before we can determine the biogeography of this interesting group of fishes.

## Acknowledgements

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### Other Specimens Examined

*Chaetostoma platyrhyncha*, FMNH 96945, 14; FMNH 97569, 8; FMNH 106017, 1; FMNH, 106018, 5; 106019, 7; ANSP 84570, 1, cleared and stained.

*Cordylancistrus daguae*, MCZ 35868, 2.

*Cordylancistrus torbesensis*, AUM 22192, 4; MCNG 8066, 1, cleared and stained.

*Cordylancistrus platycephalus*, LACM 57394-1, 2.

*Chaetostoma guariense*, AUM 39880, 1, cleared and stained.

*Chaetostoma stanni*, INHS 28838, 1, cleared and stained.

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### Appendix I

Character state data for *Cordylancistrus santorosensis* based on Armbruster (2004).

#### *Cordylancistrus santorosensis*

01000122011001011101100002001100110101100102000000121000200011011111000001211001  
11111002011010002102010000000110000000001010000020010010012001000010110000000201  
0110002110101020100001220000011010132000100000000000000